vol. IV no. 5
January, 1945

School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

Vocational Education's Newest Challenge
by Lawrence W. Prakken

Sterling Cuff Links
by Rufus Jacoby

Machinists in the Making
by Perne, Pancost, and Robinson

Learning Electronic Circuit Elements
by Morris Slurzberg and William Osterheld

On the cover: A student in the Brooklyn Technical High School making a test for strength of materials. See page 7 for a discussion of this type of vocational-technical education.

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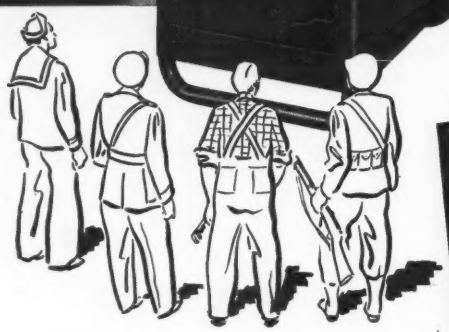

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School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

CONTENTS

January, 1945
Vol. IV, No. 5

Vocational Education's Newest Challenge. Lawrence W. Prakken..... 7
Vocational-technical training for industrial occupations is a slighted field. A national committee recommends that more attention be paid to it as a major postwar responsibility of schools.

Sterling Cuff Links. Rufus Jacoby.....10
Teachers of metalcraft will find this project useful for teaching many operations and skills as well as embodying a finished product of considerable intrinsic worth.

Report from Philadelphia.....11
News of the AVA convention.

Machinists in the Making. Frank Perne, Maurice Pancost, and G. G. Robinson 12
This is a description of a unique system of machine-shop instruction based on modern poduction methods.

Learning Electronic Circuit Elements. Morris Slurzberg and William Osterheld 14
Wall boards showing the various types of circuit elements help these instructors to do a better job of teaching.

School Shop Kinks.....18
Short cuts to make teaching easier and more effective. Send in your "Kink" today.

Strictly Personal 20
About your fellow teachers.

In the Morning Mail.....21
Comments from readers.

Oil That Machine! Donald G. Brossman.....22
Lubrication tags help to remind students of the need for keeping machinery well lubricated.

Three Cans, a Little Solder, Paint, Make This Bed Lamp. Donald Hennick....22
This simple sheetmetal and electrical project is suitable for beginning students.

News 24
What's happening in the field of education.

News from Industry.....26
New products, new equipment, industrial advancements. Send in a coupon for information and materials.

Instructional Resources: Books, Pamphlets, Visual Aids.....28
Listings in easy form for clipping, pasting to cards, and filing. Keep your industrial-education bibliographies up-to-date.

from Washington. Michael Paca.....32
News from the Nation's Capital of interest to shop teachers.

Index to Advertisers.....32

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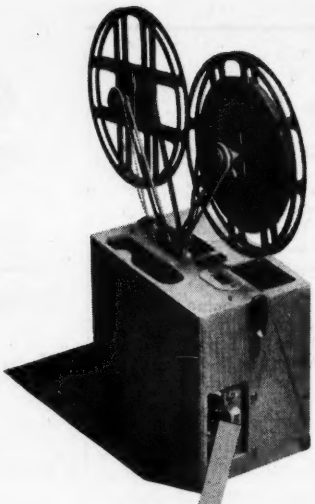

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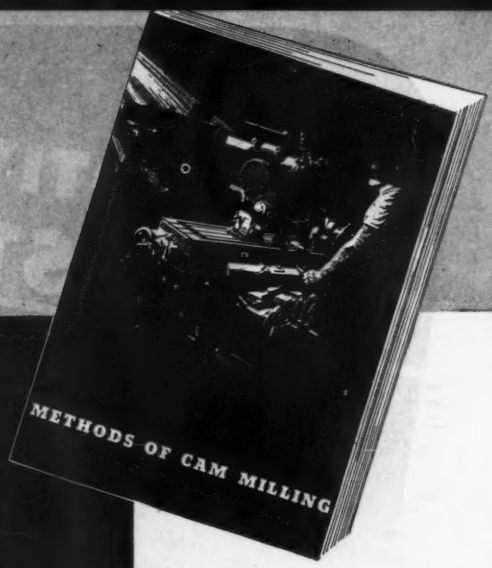

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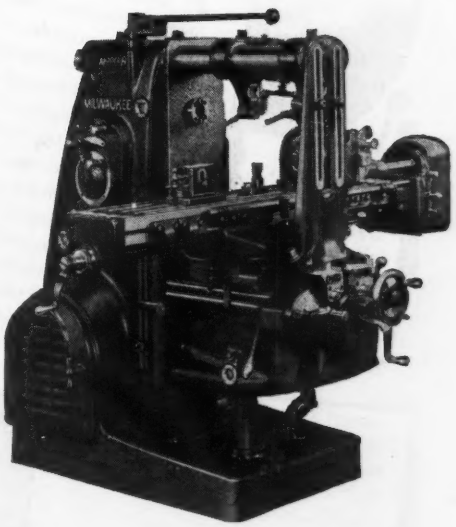

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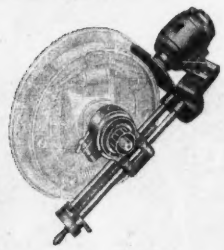

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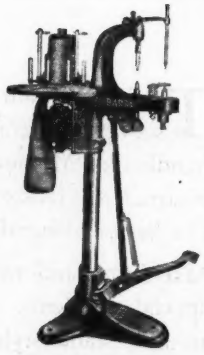

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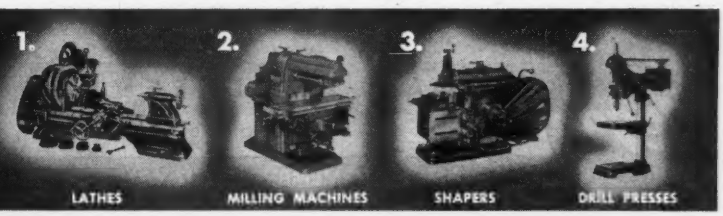

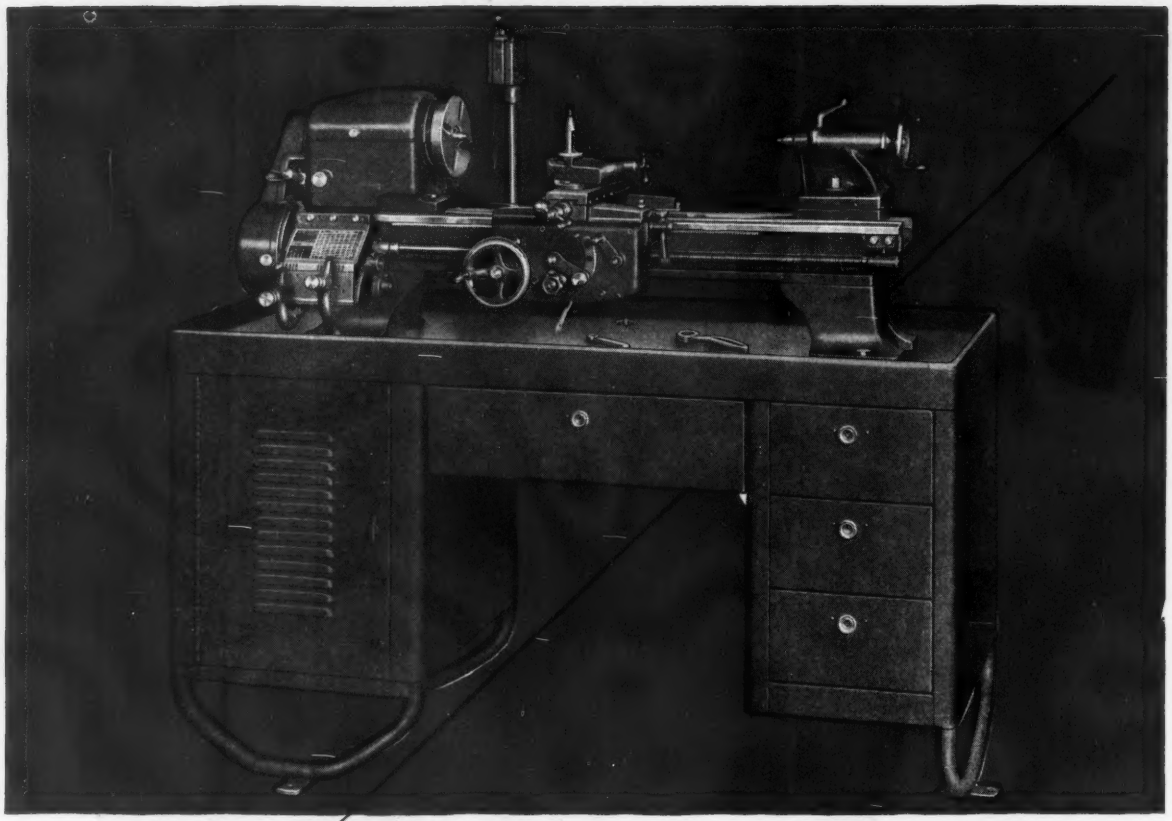

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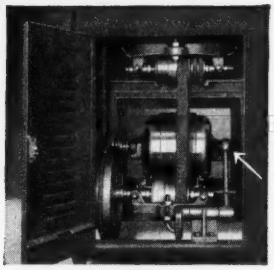

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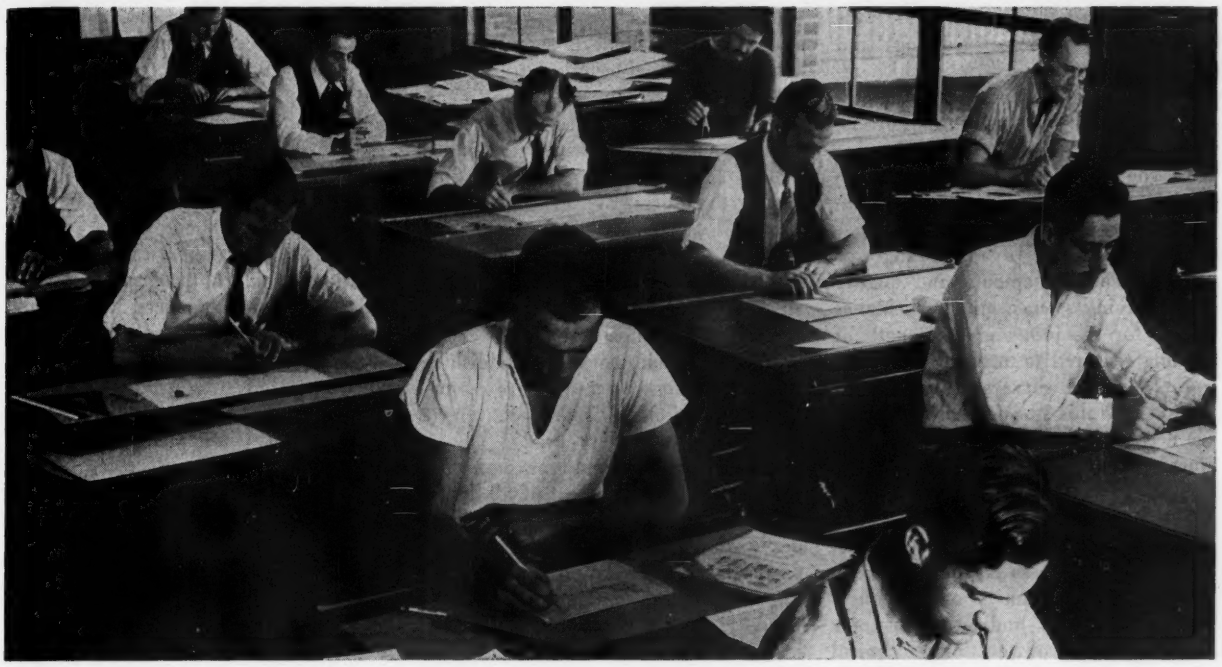

Drafting is one of the vocational-technical courses which should receive greater emphasis.

Vocational Education's Newest Challenge

BY *Lawrence W. Prakken*
EDITOR OF SCHOOL SHOP

FRESH from Washington comes a report that indicates in fact-supported fashion a new direction which vocational education must take to keep up with its obligation to the youth of the nation. The fact that the report comes from Washington should not mislead educators into thinking that here is another pronouncement from on high hastily put together after a cursory visit to the hinterlands by starry-eyed dreamers. Rather it is the result of hard labor on the part of a consulting committee and a working committee, made up of a dozen members of the consulting committee, who represent all sections of the country and all fields concerned with vocational education.

In brief, the report which is entitled *Vocational-Technical Training for Industrial Occupations* importunes vocational education to expand its functions because technological developments in industry have created a demand for personnel trained in technical occupations with the demand far exceeding the supply. Comprehensive surveys of 22 representative industries led to the committee's conclusion.

The following definition is offered by the committee: *Vocational-technical training is designed to prepare persons for, or to upgrade them in, technical occupations for which engineering school graduation is not required.* The technicians produced by such a program include draftsmen, laboratory assistants, operators of highly technical equipment, maintenance and repair men dealing with technical equipment, production supervisors, and technical salesmen. The committee holds that vocational-technical training differs from trade training in that it stresses definite industrial applications of the laws of science and technical knowledge and the necessary skills involved while trade training emphasizes the mastery of manipulative skills together with an understanding of the sciences involved. The committee recognizes that there may be no hard and fast rule for distinguishing vocational-technical training from trade training and that it is not necessary to be overly concerned about the matter in practice. Nevertheless, the committee is of the opinion that vocational-technical courses stand more or less aside from manipulative objectives or are in advance of trade training such as supplementary courses in estimating for building contractors, drafting applied to plumbing installations, jig and tool design, production planning for machine shops, and metallurgy applied to welding.

It is recognized in the report that there are numerous institutions now offering this type of training. Many high schools, technical institutes, junior colleges, and private institutions train technicians, yet the numbers of students enrolled, the range of courses offered, and the geographical spread of such institutions is entirely incommensurate with the growing demands of widespread industrial enterprise. Detailed analysis of the offerings of most of these schools is given in the report.

The report itself is over 300 fact-filled pages long. In order to bring to SCHOOL SHOP readers the major conclusions and recommendations, the following points are taken from the report:

1. The present situation in industry warrants a large expansion of vocational-technical training programs.

2. The occupations requiring vocational-technical training in large or small amounts appear to include four groups: Engineering aides and science aides requiring a year or two of pre-employment training; limited technicians requiring relatively short training; production and maintenance supervisors

requiring industrial background, plus supplementary technical training; and persons in semitechnical jobs which require combinations of technical and other training, such as selling or accounting.

3. The occupational analyses developed in connection with this study reveal various levels of technical needs of workers, indicated by the range of technical content, amount and quality of underlying science and mathematics needed for the job, and the length of training required to attain competency.

4. Industrial surveys made in connection with this study indicate an average need of 5.2 technicians for each engineer, with a range of ratios from 2 to 1 to 20 to 1.

5. The geographical field in which vocational-technical training now finds a place of usefulness is widening.

6. Many different types of educational institutions and programs now provide training of vocational-technical character.

7. Although some excellent vocational-technical training is now being provided in technical high schools, a trend appears to be toward the post-high-school years.

8. Institutions providing vocational-technical training should combine evening departments with day programs wherever this is feasible.

9. Evening and other part-time programs of supplementary type for employed workers should constitute an important part of the schools operated in urban areas for the training of technicians.

10. Organized preemployment curriculums should be made available in evening or other part-time schools for qualified employed persons who wish to prepare for occupations of the technician types.

11. Combinations of vocational-technical programs with others, such as skilled trades or engineering training, under the same roof or on the same campus appear to have both assets and liabilities, when considering the effectiveness of the vocational-technical program.

12. It appears that no one type of institution can successfully meet all of the needs of all forms of vocational-technical education in all areas of the country.

13. The situation appears to warrant the continuation of high quality private institutions, both nonprofit-making and proprietary, in the vocational-technical field.

14. Correspondence instruction appears to have an important place in the field of vocational-technical training.

15. In the development of vocational-technical training programs, there are certain underlying principles which should be taken into consideration. Among these are:

(*a*) Programs for given areas, state, district, or local, should be developed in accordance with the needs of the given area for both preemployment and supplementary training.

(*b*) In planning and establishing vocational-technical training programs, the cooperation of both management and labor should be secured.

(*c*) Programs should be developed through cooperative effort of all educational leadership concerned; undesirable duplication of services between institutions and agencies should be avoided.

(*d*) State and local programs should be developed and maintained in those institutions which are in the best position to render the most effective service, taking into consideration the present facilities and the educational leadership of the area.

16. The local planning of vocational-technical programs, including representation of management and labor, appears to be the most desirable approach.

17. As the employer of the product of vocational-technical training institutions, industry has an important role in this field. Industry should share the responsibility for providing the narrowly specialized training needed by its workers and applicable only to its business. Industry should actively cooperate with vocational-technical training institutions in helping them to organize their programs on a sound basis, and to maintain them in keeping with industrial conditions.

18. The use of advisory committees is essential to careful program planning.

19. Preemployment vocational-technical training should be aimed at groups of closely-knit occupations rather than at narrow specialization or at broad general fields.

20. Curriculum patterns differ greatly in various vocational-technical institutions, in accordance with local needs and conditions, and care may well be exercised in "lifting" curriculums from other schools for use in new situations.

21. Certain content is found which is common to many different occupations of vocational-technical type; such as supervisory skills, basic technical mathematics, and basic applications of physical science. This should be taken into account in the planning of curriculums.

22. The preemployment curriculum for vocational-technical training should have well-planned proportions of vocational-technical content and essential content of general-education character. Present practices indicate the desirability of fairly high proportions of vocational-technical content.

23. Young persons graduated from vocational-technical programs who are capable of doing advanced work should not be unduly handicapped when seeking admission to institutions of higher education.

24. Admission standards for vocational-technical schools should insure adequate preparation necessary for successful work, but should have as much flexibility as is practicable.

25. For schools of the technical institute type no widely accepted credential has been devised. This appears to be a problem of considerable importance for these schools, and one which merits attention.

26. Educational leadership is greatly needed in the field of vocational-technical training.

27. Teachers of vocational-technical subjects should be required to have adequate basic scientific and technical training, extensive industrial experience, a reasonable amount of appropriate teacher training, and personality traits which meet the needs of teaching situations.

28. Effective programs of vocational-technical training require plant and equipment suited to technical training and in keeping with current industrial practice.

29. In the various war-training programs numerous new methods and technics have been developed which improve the efficiency of teaching. It is recommended that vocational-technical schools become familiar with these methods and technics, and utilize, with necessary adaptations, those which have proved their worth.

30. There appears to be need for the development of instructional material particularly suited to vocational-technical training.

31. Effective guidance service with respect to vocational-technical training is needed in the feeder schools from which students enter this field of education.

32. In locations where the support of industry is conducive to such a program, the cooperative plan of half-time school alternating with half-time employment, in work to which the school program is related, is recommended for serious con-

(Continued on page 31)

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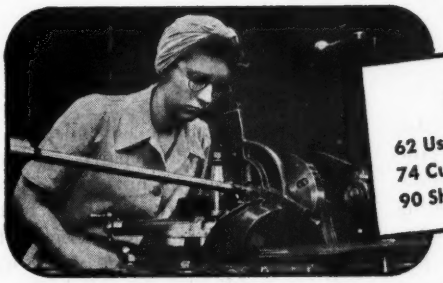
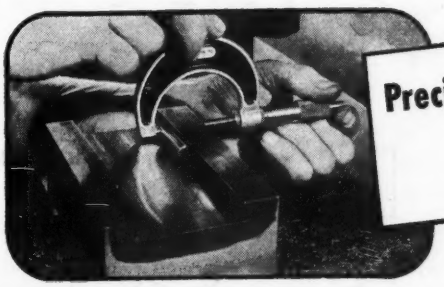


Machine Tools

62 Using a Steady Rest
74 Cutting a Round End Keyway
90 Sharpening a Side Milling Cutter

Sheet Metal Work

131 Blanking Sheet Metal with Hand Snips
135 Finish Forming by Hand
138 Drilling with Portable Drill Motors



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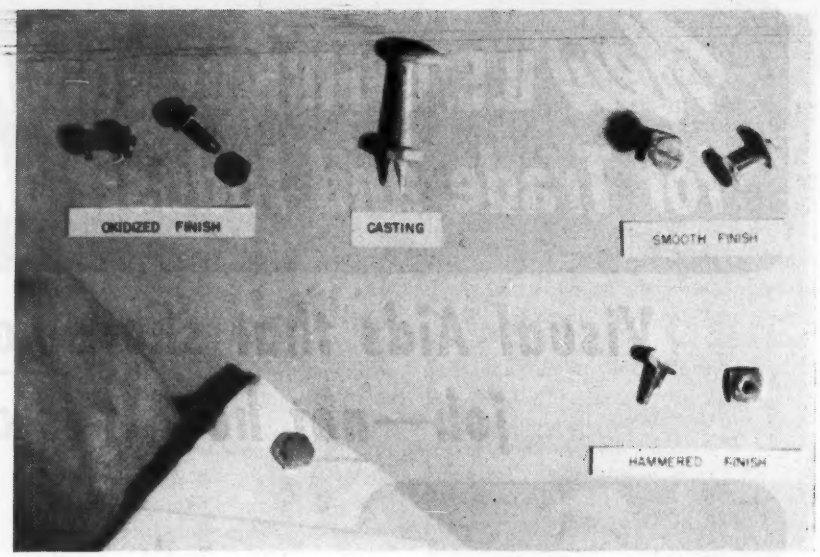
Sterling Cuff Links

BY *Rufus Jacoby*

Teachers of metalcrafts will find this an interesting project for students because of the many processes involved and because of the intrinsic value of the finished project. The superior teacher will utilize all the educational opportunities inherent in the project. Rufus Jacoby teaches at the Coolidge High School, Washington, D. C.



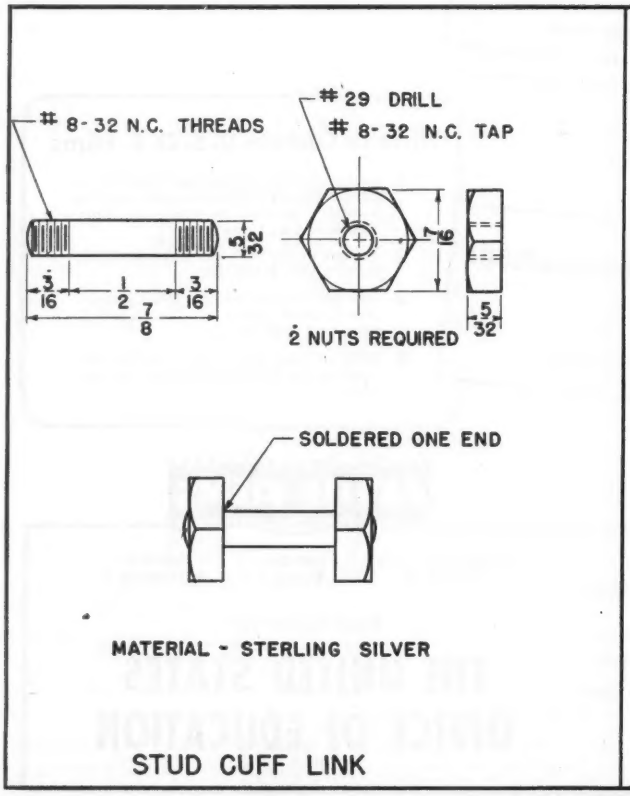
TESTED INSTRUCTIONAL PROJECT

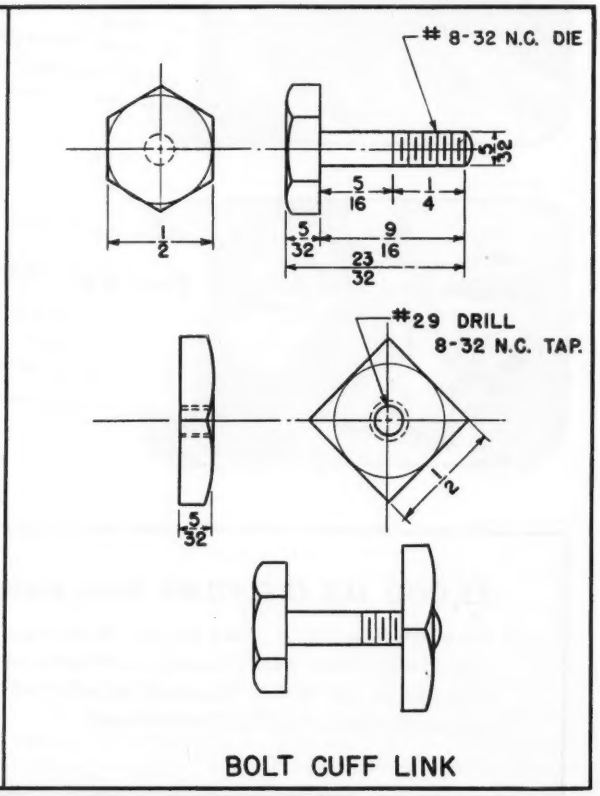
MINIATURE stud and bolt sets in sterling silver make unique, useful, and attractive cuff links which appeal to father as well as to the industrial arts general metalcrafts student. The idea developed out of the "form follows function" approach to design. The drawings accompanying this article may be followed or the student may express himself through his own design. However, the finished product should have all the earmarks of the commercial fastener.

The stud set, designed for the slow student, consists of the following processes: casting, cutting, layout, filing, drilling, thread cutting, silver soldering, finishing and evaluating. The stud is made of "sterling" rod which is purchased in the desired diameter. The pattern for the nut may be made of a machine nut with the threaded hole filled with sealing wax or paraffin. The pattern must be larger than the finished nut to allow for shrinkage and finishing. A jeweler's flask and prepared sand are used to make several nuts at one pouring. One nut is silver soldered to the stud with the stud extending slightly beyond the nut. The finish may be a high polish or oxidized and highlighted.

The student may check his plan of procedure with the following suggested steps:

1. Make original design or sketch drawing.





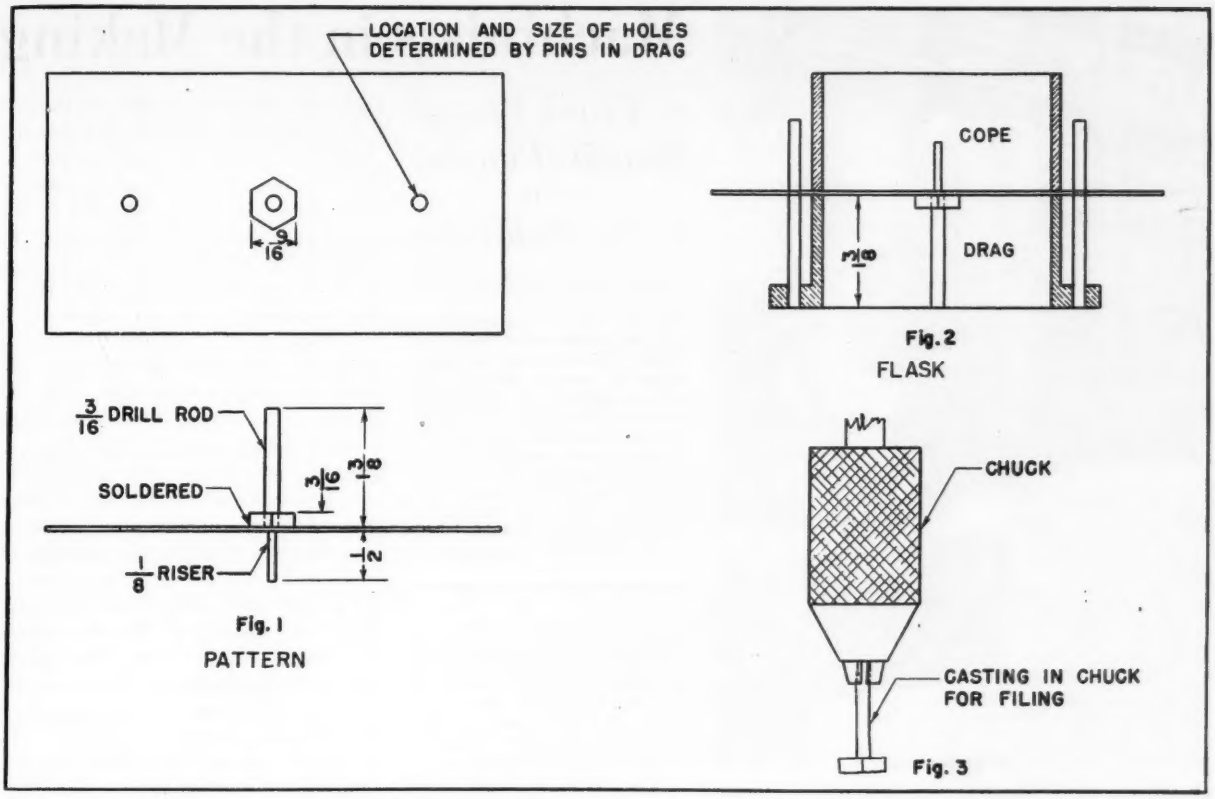


Fig. 1
PATTERN

Fig. 2
FLASK

Fig. 3

2. Have plans checked.
3. Fasten 5/32" rod in vise and thread ¼" of rod with No. 8-32 N.C. die. Reverse die to get a full thread.
4. Cut stud to length with jeweler's saw and file ends.
5. Prepare pattern for nut.
6. Make mold.
7. Heat sterling scraps in No. 1 graphite crucible.
8. Pour.
9. Remove casting from sand and discard "dead" sand.
10. Cut casting from sprue with jeweler's saw.
11. File casting with needle files.
12. Layout, centerpunch, and drill No. 29 hole.
13. Tap with No. 8-32" N.C. tap.
14. Finish surface with Scotch stone.
15. Solder one nut to stud.
16. Polish; oxidize.
17. Evaluate.

The bolt links require approximately 1 Troy ounce of material costing less than a dollar. The market value of this set is at least 15 times the cost of materials. Pupils may be encouraged to take their products to a reputable jeweler in the community for appraisal.

The pattern for the bolt (Fig. 1) is made of 3/16" drill rod screwed to a 5/8" x 5/32" piece of brass filed to the shape of the bolt head. The pattern is soft-soldered to an 18-gauge plate which fits over the pins in the drag (Fig. 2). This plate holds the pattern in place while the sand is packed around it. If the pattern is put into the drag part of the flask, the levers on the sides of the drag will facilitate removal of the pattern from the sand. A riser is attached to the plate opposite the bolt head. The molten metal in the riser cavity "feeds" the bolt head while the head solidifies and shrinks. Without this riser the head would have a large cavity, caused by shrinkage. (Notice the tapered riser attached to the casting in the picture.) The flask is 3" in diameter and 2¾" high. The metal is poured directly into the pattern cavity; thus there is no pouring sprue. The metal is poured at the lowest temperature at which it will flow. Pouring must be continuous.

Cut the bolt to 1¼" and fasten in a drill press chuck (Fig. 3). Run the press at moderate speed to file to 5/32" diameter. Remove file marks with steel wool while in the chuck. File the head with a needle file and remove the file marks with Scotch stone or steel wool before cutting the threads. A desirable finished surface is obtained by peining the bolt head and nut. Polish with rouge.

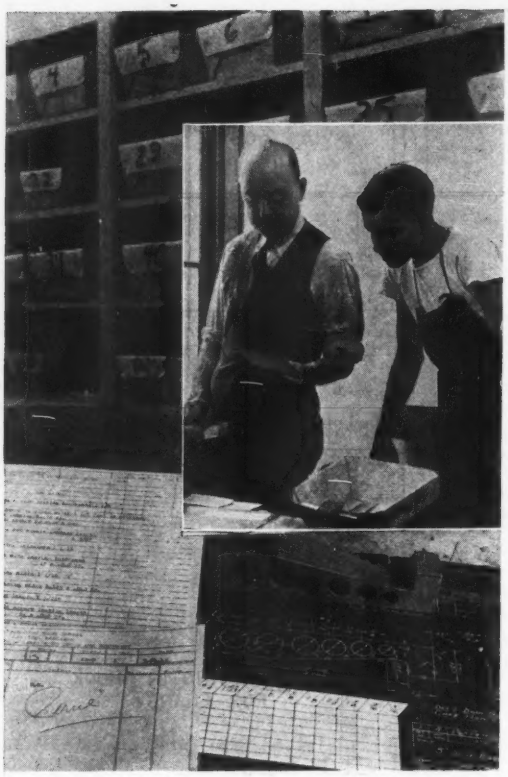
The pupil's written or oral evaluation of the product, its design, processes, technics, materials used, and time consumed, is an important part of the job. from the standpoint of achieving maximum educational values.

Report from Philadelphia

Meeting in Philadelphia, Pennsylvania, December 6-9, the American Vocational Association went on record as dedicating itself to the task of aiding in the provision of peacetime jobs for all the employable workers of the nation. More than 2000 vocational educators assembled for the sessions from every state in the union and some territories.

The association did not take a stand on the issue of compulsory military training but did state, however, that it was "emphatically opposed to the organization of any separate national program of education created under the guise of compulsory military training."

New officers of the AVA are president, *M. D. Mobley*, state director of vocational education for Georgia; vice-president for business education, *Ira W. Kibby*, California State Department of Education; vice-president for industrial arts education, *Frank C. Moore*, director of industrial arts, Cleveland, Ohio, schools; vice-president for home economics, *Anna K. Banks*, state supervisor of home economics for Oklahoma; and past president in charge of vocational guidance, *John A. McCarthy*, assistant commissioner of education for New Jersey. *L. H. Dennis* was reelected executive secretary and *Charles W. Sylvester*, director of vocational education for Baltimore, was reelected treasurer.



Machinists in the Making

BY *Frank Perne, Maurice Pancost* AND *G. G. Robinson*

Here is a unique system of machine-shop instruction based on modern industrial practice. Operations of varying difficulty are always available for instructional purposes. The system is based on quantity production with constant inspection and rejection of parts which fail to meet specifications. Messrs. Perne and Robinson are instructors and Mr. Pancost is principal of the Lansing, Michigan, Technical High School.

Student going over process card with instructor before setting up operation for work in tote box on desk. Below are shown drawing, example of finished part, and student's progress sheet. Above is shown a rack of tote boxes.

A METHOD of teaching the machinist trade based on operations rather than on projects is being developed cooperatively by the staff of the State Board of Control for Vocational Education and the Lansing Technical High School. The plan calls for certain equipment without which it cannot be operated. These include: (1) a list of instructional vehicles, (2) a set of blueprints for these projects, (3) process cards and a file and labeled separators for them, (4) a copy of a trade analysis or list of operations to be taught, (5) a supply of tote boxes numbered serially, (6) a rack or cupboard for tote boxes, (7) student's progress record forms and file cabinet for them, and (8) sufficient inspection facilities for the projects selected.

Having provided the equipment, the instructor lists those operations which, according to his course of study, he is to teach. He next chooses the vehicle which he plans to use in teaching these operations. (It usually is necessary to provide several such vehicles.)

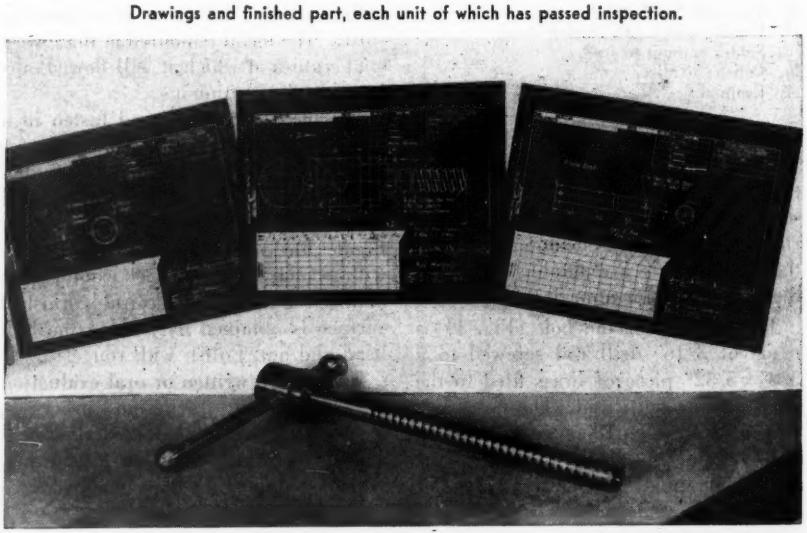
On a process card the instructor or an advanced student lists in the proper order the operations involved in making a part. This is done for every part or object selected as an instructional vehicle. These cards are then placed in the file under the head for the first *unfinished operation* which usually is "cut stock." In time, as work progresses, these cards will become distributed in the file and a variety of operations will be available, each recorded on the cards and filed under the heading of the operation to be done.

The student has a progress sheet on which he records the time spent in learning the operations assigned. In selecting his new operation, the instructor gives consideration to the student's previous assignments and success. He selects from the file a process card for the next operation to be learned. This card gives the serial number of the tote box containing parts ready for this operation. This box of parts is next obtained by the student, together with the necessary tools and a blueprint of the part to be made. The instructor, assisted by a student group leader, then demonstrates the operation and assigns the remaining parts for practice. A floor inspector checks the first few pieces completed and when all the parts are ready, the student takes them to an inspector who checks each piece, removing those to be scrapped. (Since but one operation is to be checked, this will take only a few minutes.) The student then enters his time on the progress sheet. The inspector indicates the quantity of parts ready for the next operation on the process card, after which it is filed under that operation. He also returns the tote box to the rack. The student reports to the instructor for a new assignment which may be a new operation, the same operation performed on a different part, or more of what he has just completed, according to his need.

Whenever a tote box of parts for a needed operation is lacking, it will be necessary for the student to start out with new stock or with an earlier operation and repeat previously learned operations until the parts are ready for the one assigned. There will be less need for this as the system becomes balanced. From time to time the box of parts may require sending to another shop for welding or heat treatment. The same system can be used in these shops also. Upon completion of these opera-

(Continued on page 21)

Drawings and finished part, each unit of which has passed inspection.



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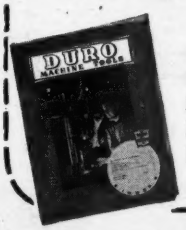

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Learning Electronic Circuit Elements

BY *Morris Slurzberg* AND *William Osterheld*

Teachers of radio, electricity, and electronics will find the wall boards described here of real value. Morris Slurzberg and William Osterheld teach at the Wm. L. Dickinson High School, Jersey City, N.J., and are authors of the new book, "Electrical Essentials of Radio."

MANY of the tubes used at the present time in electronic devices have at least six elements: heater, cathode, control-grid, screen-grid, suppressor-grid, and plate. There are generally at least two circuit elements used for each element in the tube and many units contain still more. Each circuit element has at least two connections; therefore, the total number of connections required for each tube and its immediate circuits will be (12 × 2) + 6, or 30. The average radio receiver generally uses less than ten tubes. However, electronic equipment for television, industrial, or therapeutic equipment may average more than 25 tubes and in many cases as many as 100 tubes may be used in a single device. This means that for a 25-tube set there will be 25 × 30 or 750 required connections; a 100-tube set will accordingly require 100 × 30 or 3,000 connections.

From the above illustration it can be seen that electronic circuits become quite complex. It can also be seen that the circuit elements used such as resistors, capacitors, and inductors are the same as those used in electric circuits. A thorough knowledge of electric circuits is therefore essential to the study of electronics.

The nomenclature, variety, and size

Fig. 1—Fixed and variable carbon and wire-wound resistors.

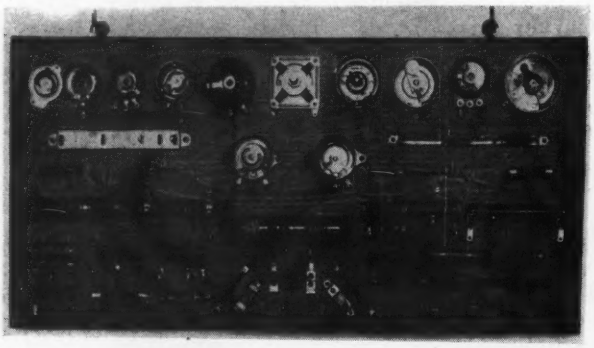


Fig. 2—Small fixed paper and mica dielectric capacitors.

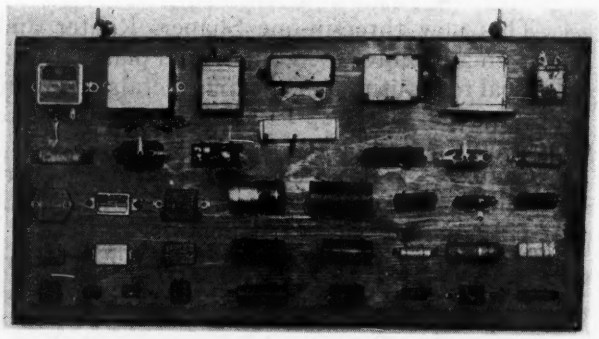


Fig. 3—Large fixed paper dielectric capacitors.

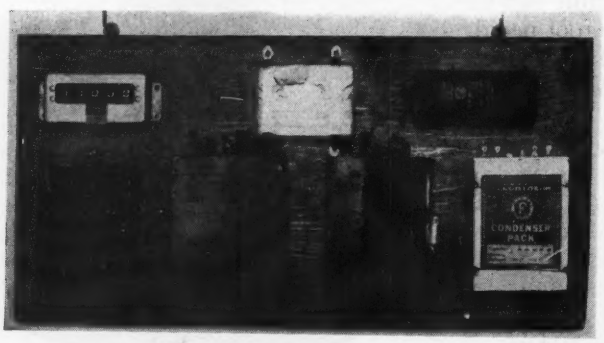


Fig. 4—Dry and wet electrolytic capacitors.

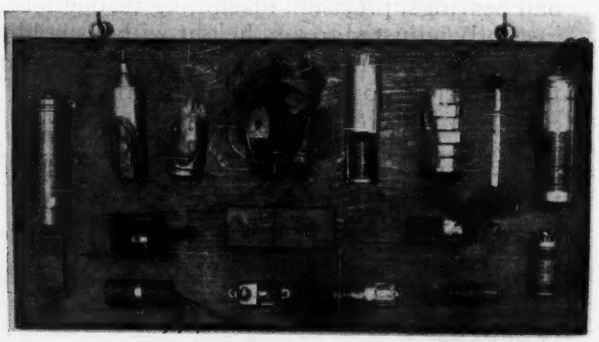


Fig. 5—Variable and adjustable capacitors.

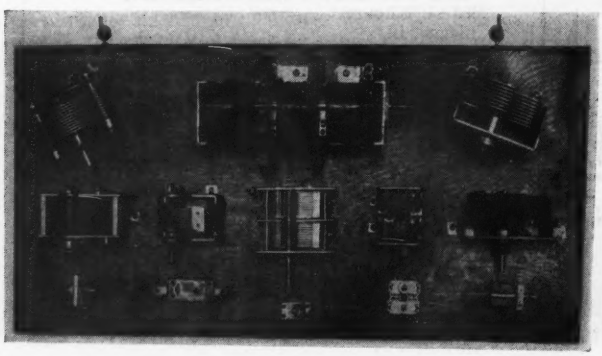
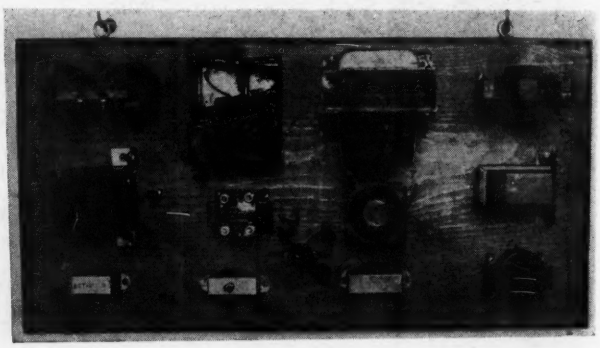
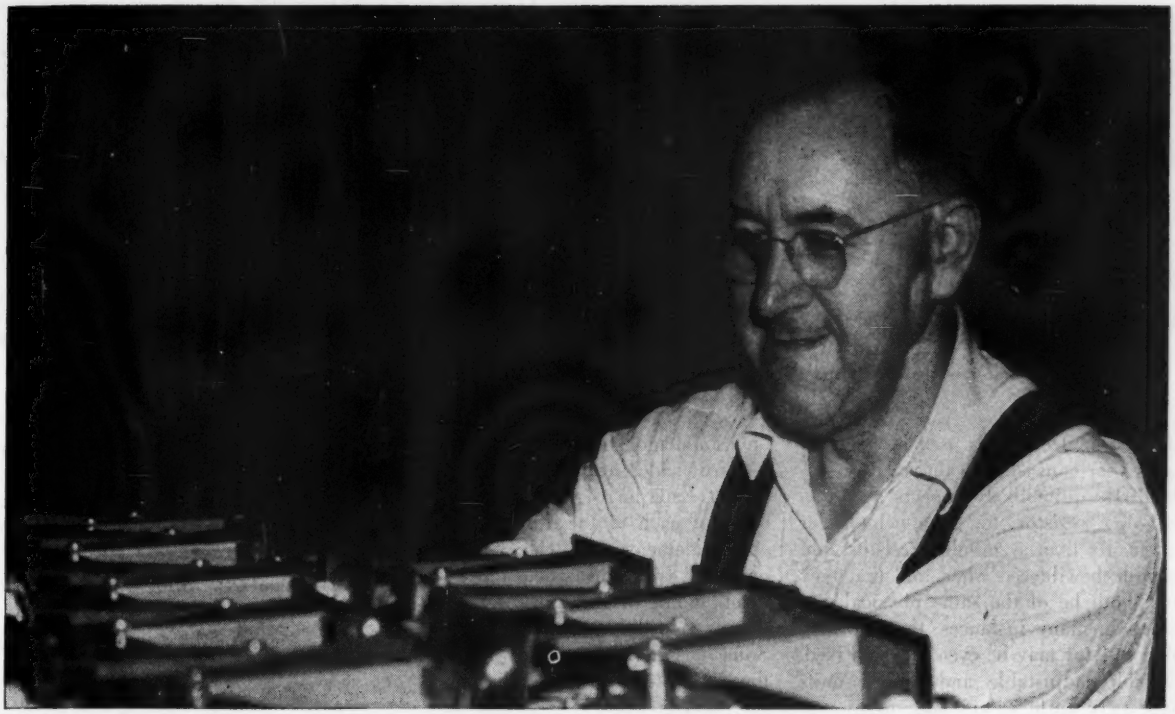


Fig. 6—Iron-core choke coils and transformers.





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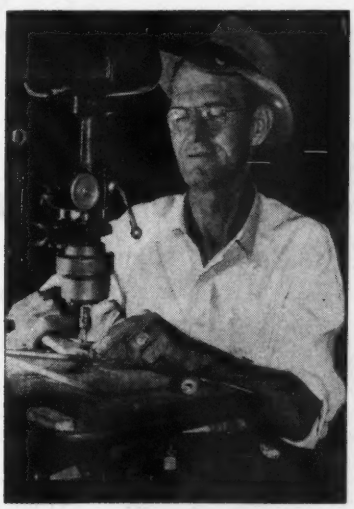

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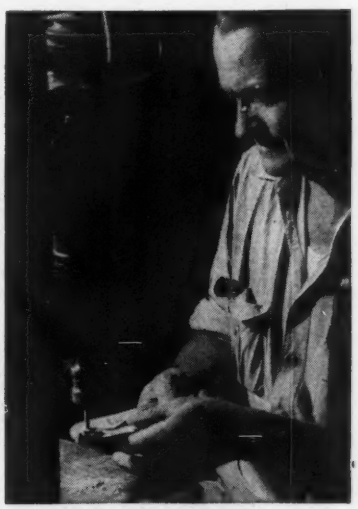

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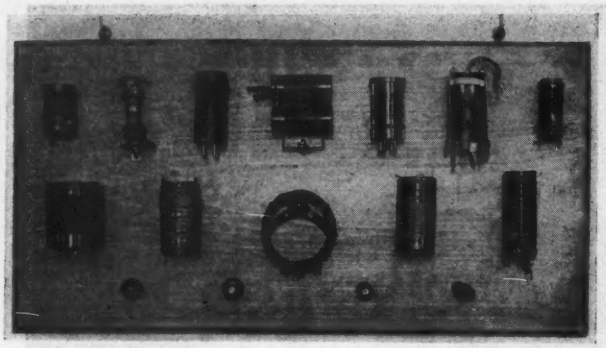

Fig. 7—Air-core choke coils and transformers.

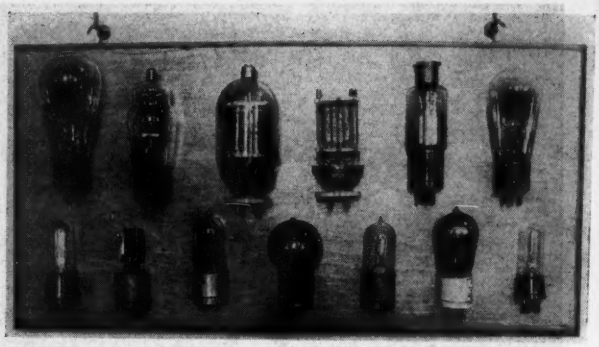

Fig. 8—Early stages of vacuum-tube construction.

of the circuit elements used in electronics is very confusing to the average student. He quite likely expects a 2,000,000-ohm resistor to be much larger physically than a 200-ohm resistor, and is quite bewildered when told that they may both be of the same physical size or, as in many instances, that the 200-ohm resistor may be even larger. Fixed, variable, adjustable and tapped units have very little significance to him as he cannot visualize how these conditions are obtained.

The authors have solved this problem in their classes by using a series of combination demonstration and work boards a few of which are illustrated in figures 1 to 8. Each board contains the various types of each of the different kinds of circuit elements used. These parts were obtained from discarded radio equipment. Some of the units were cut sectionally to illustrate their construction. Some defective units were mounted on the boards to be tested by the pupils for their defects.

These boards are very useful for demonstration purposes when the various types of circuit elements are being explained. As a work board they can be used by a group of two or three pupils to:

1. Individually study the construction of the various types of circuit elements,
2. Apply the color codes to resistors, capacitors, and transformers,
3. Measure the values of resistance, capacitance, and inductance,
4. Check the rated values and the tolerances of various units with their measured values,
5. Test for faults.

(Continued on page 16)

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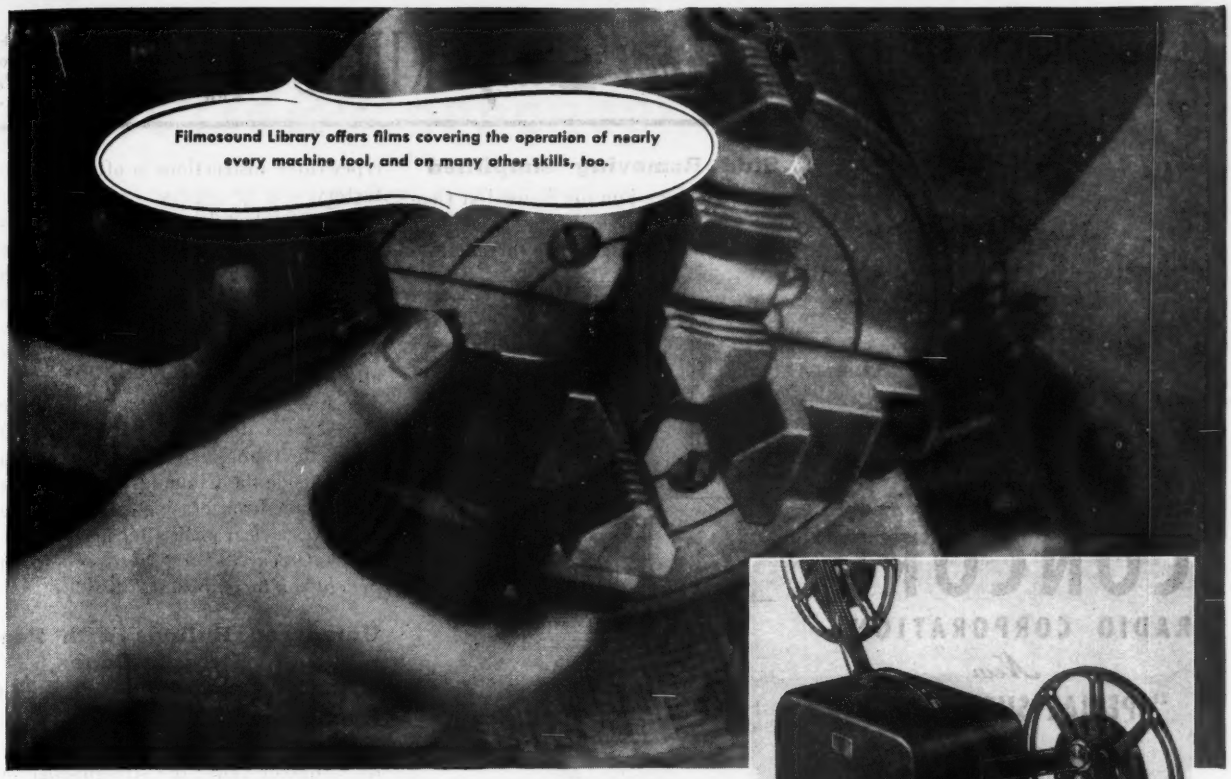

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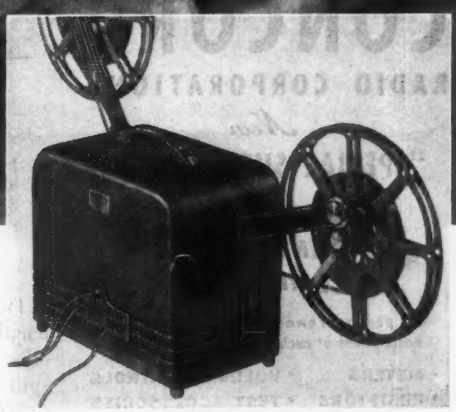

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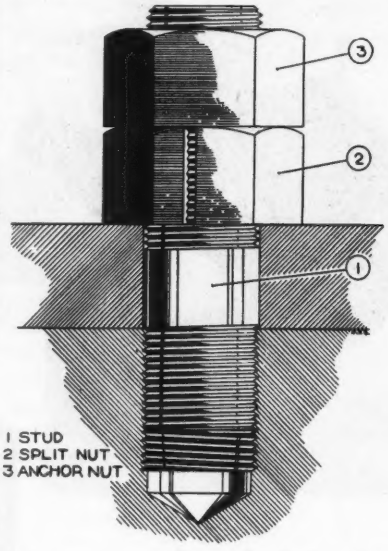
Stud Removing Simplified

A selflocking jam nut is used at General Electric's Erie Works to remove studs without damaging the threads.



Two standard nuts—one slotted lengthwise—are backed against each other. The pressure of a wrench on the split nut binds it to the stud threads, providing extra friction by which the stud may be removed. The second nut is used as an anchor.—*W. J. Curry, General Electric Co., Schenectady, N.Y.*

Who's Got the Cutter?

Boys in machine-shop classes were hiding lathe cutters so that the supply diminished to the point where there were not enough for the class. To save time, boys had been allowed to get the cutters themselves without a tool check. This resulted in a shortage of cutters for some classes. Now the instructor carries the cutters in his pocket as he helps about the shop. When a boy needs a cutter it is quickly dispensed, the teacher receiving a small piece of paper from the boy on which he has placed his name. When the boy has finished with the cutter he returns it to the teacher and receives in turn the signed paper. This system operates very efficiently and, needless to say, names are very seldom found in the teacher's pocket after class. —*Frederick W. Landers, High School, Montclair, N.J.*

Making Tracings Last Longer

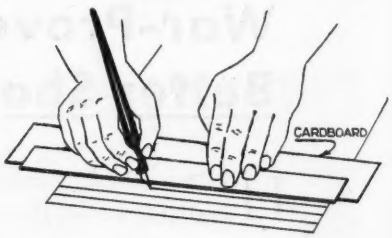
Blueprinting from tracings having typewritten instructions is often unsatisfactory.

Many teachers know the trick of placing a black carbon paper against the back of the tracing when typing which gives an impression on both sides of the tracing. This helps make a better blueprint but the carbon wears off the back after several exposures.

I find that a piece of cellophane placed over the back of the tracing across the typing and fastened by scotch tape outside the trimming lines prevents the carbon from erasing and smudging and gives a clear print after many exposures.—*Orren R. Tarr, Dorchester High School for Boys, Boston, Mass.*

Unmarred Rulings With Pen and Straight-Edge

When ruling lines the danger of smearing or marring paper with ink spots can be avoided by placing a strip of cardboad under the straight-edge or ruler. If such rulings are made frequently, a layer or two of heavy gummed tape, pasted about 1/8" away from the edge on the underside of the ruler, will facilitate the work and make the cardboard strip unnecessary. Either fountain pen or steel pen point may be used but the rim of the straight-edge should be wiped dry whenever ink appears to collect.—*Michael Ligocki, Gary, Ind.*



Painting for Printers

I paint the lips of my galleys red. This shows the tyro the danger line. He is less wont to shove lines of type off the edge of the galley because the galleys are the same color or tone as a steel "stone" and the student frequently in moving lines about on a galley, does not realize he is at the edge. The result is pied lines. I paint the lips of galleys containing special jobs with yellow paint. This enables one to search out forms quickly.—*A. Lewis Herzberg, L. G. Hine Junior High School, Washington, D. C.*

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Today's production lines call for men skilled in the operation of modern machinery. Today's trainee, if he is to fit himself for such opportunities — if he is to make himself valuable for war production work — should be trained in the operation of full-sized war plant machinery.

Today's South Bend Lathes, embodying improvements developed to meet exacting war production requirements, are highly practical for pre-employment training.

Carefully designed for simplicity and ease of operation, these lathes have no unnecessary gadgets or intricate controls to confuse the beginners. Because they are so widely used in industry, their use for training purposes means a saving in on-the-job training time.

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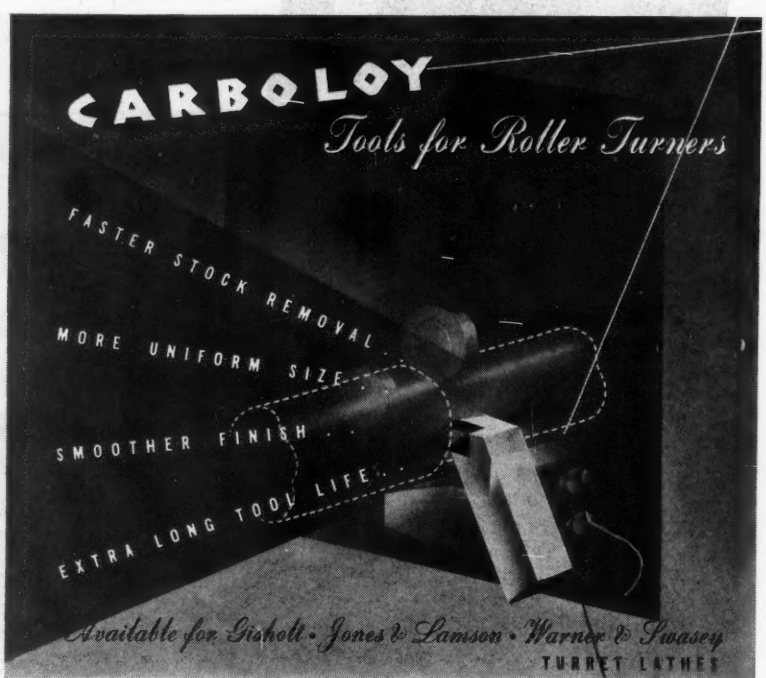
ABOUT YOUR FELLOW TEACHERS

JAMES T. GEARON, former special representative in the VTWPW program, has been appointed special agent for research in vocational education on the staff of the Research and Statistical Service of the Vocational Division, U.S. Office of Education . . . JULIAN A. MCPHEE, in addition to his duties as president of California Polytechnic School in San Luis Obispo, has been appointed director of vocational education for the state of California . . . ARTHUR L. HOPPER, director of fine and industrial arts, has been appointed assistant superintendent of the Plainfield, N. J., schools. . . . Replacing O. D. ADAMS, who is on leave of absence from his duties as Oregon state supervisor of trade and industrial education, is W. W. MORSE . . . R. L. GRANDLE, of High School North, Wichita, Kans., has taken over the architectural drafting taught last year by JOHN BIDDLE. The latter has taken a position in industry . . . Now teaching industrial arts at the Mishawaka, Ind., junior high school is RICHARD BROLLIER, former



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Jasper, Ind., teacher . . . Three New Jersey vocational and industrial arts teachers who have recently announced their intentions to retire from active service are ROBERT O. BEEBE, director of the vocational schools of Essex County; DR. ERNEST KENT, director of vocational education and industrial arts of Jersey City; and E. F. JUDD of Montclair . . . EVAN BOILER, formerly of Hooper, Nebr., is now teaching shop and radio at Oakland, Nebr. . . . EUGENE CARLILE, industrial arts instructor, has been appointed director of the evening school program for Abilene, Kans. . . . ARTHUR F. AHR, of Beacon, N. Y., has been appointed Senior Education Supervisor of Industrial Arts in the Bureau of Industrial and Technical Education, the State Education Department, Albany, N. Y., to work with ROY G. FALES, State Supervisor of Industrial Arts. New York thus becomes the first state in the Union to have two supervisors of industrial arts . . . Recently appointed director of the post-war building program for St. Louis, Mo., is J. ERNEST KUEHNER, former woodworking instructor at the Central High School, in St. Louis . . . H. C. MENOLD is now teaching vocational woodworking in the Jeannette, Pa., high school, having come there from Bellefonte, Pa., where he taught industrial arts . . . HENRY L. LIBERTY has retired from the Momence, Ill., schools after a quarter century of service. Teaching vocational machine shop at the Crown Point, Ind., high school is LESTER HALE, formerly of Peru, Ind.

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[We are glad to cooperate by adding zone numbers to addresses whenever we have this information. Not only does it ease the burden on the postal department but it should also help you get your magazine that much sooner.—*Ed.*]

Machinists . . . . *from page 12*

tions, the box is returned to the machine shop and eventually the parts will have been completed and inspected and ready for assembly.

Some of the advantages are that the instructor has more time to teach and plan, and the system follows more closely modern industrial practices of quantity production, constant inspection, and rejections of parts which fail to meet specifications exactly. (Reprinted by permission from the *Michigan Vocational Outlook.*)

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Oil That Machine! Lubrication Tags Remind Students

BY *Donald G. Brossman*

Instructor in the Industrial Arts Department, State Teachers College, Buffalo, N. Y.

BECAUSE school shop machines do not require frequent lubrication, students are not sufficiently impressed with the necessity of careful machine inspection and proper lubrication.

A lubrication record, attached to a conspicuous part of each machine in the shop, will call this routine constantly to the attention of students and instructor. A holder of light sheetmetal and a celluloid cover will protect the chart from being torn and soiled.

LUBRICATION RECORD

For Circular Saw

12 Points for Lubrication

Make certain you lubricate the number of points indicated above.

MONTH	DATE	BY	REMARKS
September	9-2-42	J.S.	Fill Grease Cups
	9-15-42	F.Q.	
October	10-1-42	F.M.	
November			
December			Fill Grease Cups
January			
February			
March			Fill Grease Cups
April			
May			
June			

Special Instructions

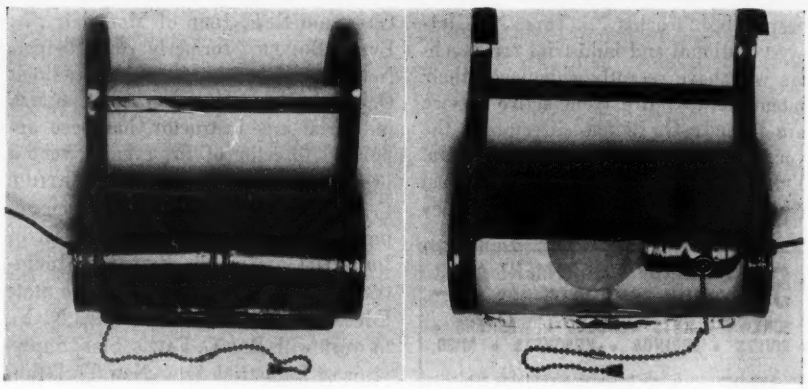
Turn each grease cup one turn for each lubrication.
Fill grease cups when indicated.

The chart here shown provides spaces for semimonthly records. Machines in constant operation will have to be cared for at least that frequently.

The number of points for lubrication can serve as a rough guide to out-of-the-way oil holes and grease cups. For the complex machines, an oiling chart is desirable.

If a student personnel system is in operation, as it should be, it should be the duty of the Machine Maintenance Foreman, or his equivalent, to check the charts daily. Then on about the first and fifteenth of the month he can carry out the instructions on the charts.

By following this lubrication record system, years will be added to the life of machines and many "frozen" or "burned out" bearings will be saved.



Three Cans, a Little Solder, Paint, Make This Bed Lamp

BY *Donald Hennick*

INSTRUCTOR, UNIVERSITY OF MARYLAND, COLLEGE PARK, MD.

TESTED INSTRUCTIONAL PROJECT

ALTHOUGH a number of useful things have been made from tin cans, here is a novel and interesting one—a bed lamp.

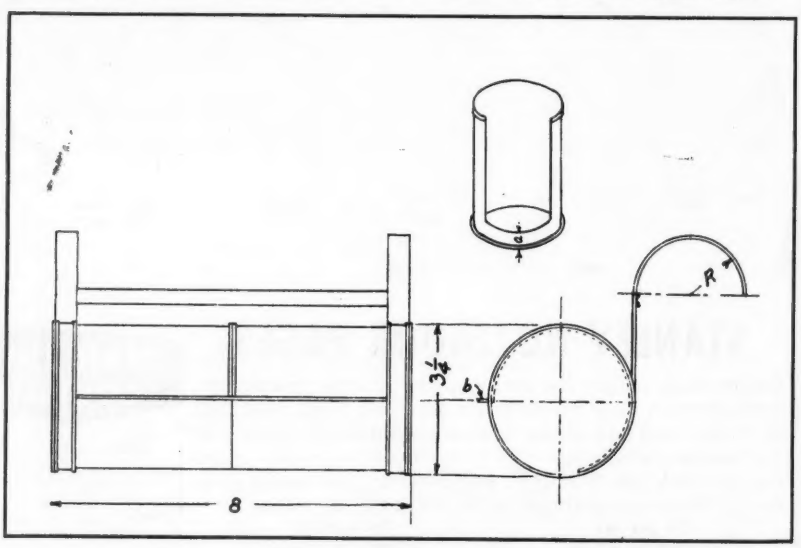
Obtain two cans, size No. 2, and cut one end entirely off of each can. Then, close to seam, mark a line down from open end perpendicular to bottom until you reach the distance *a* from the bottom of the can, which is equal to the width of an end strip.

On other side of seam, at a distance of little over one-quarter of circumference, from first line, mark another line the same distance down. Cut on lines and have opening in both cans as shown. Place the open ends of the cans together with the openings just cut, line up and solder. Bend piece *a*.

From a gallon can, cut two strips of sufficient width and length for the end strips and single hem the edges. Bend the strips around end of cans with hem on outside and solder. Make radius *R* to fit around head of bed.

Punch hole in one end for socket.

The inside may be painted with a heat resistant white paint and the outside finished to suit the individual.



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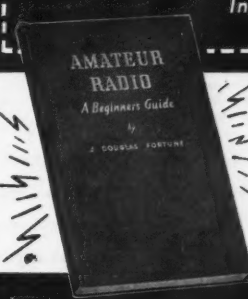

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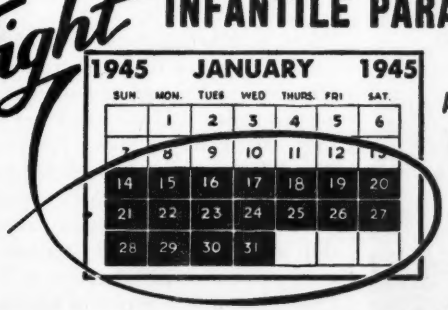

1945 JANUARY 1945

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news

WHAT'S DOING IN THE FIELD OF INDUSTRIAL EDUCATION

AIR age education is receiving serious consideration in at least six states throughout the country. California, Colorado, Connecticut, Illinois, Pennsylvania, and Wisconsin have each developed a comprehensive state plan for aviation education for the first twelve grades, including the following points: (a) a program for introducing appropriate air age materials into all regular courses of study at all grade levels in order to modernize and enrich the curriculum, (b) certain regular aviation courses in senior high schools and colleges as permanent parts of the postwar program in science education and its social significance, (c) four hours of flight experience for all high-school aviation students with full insurance and liability protection and organized to insure safety in every detail, conceived as laboratory work to augment classroom instruction in aviation, and (d) complete state and local responsibility for making aviation education an integral part of the state and local educational systems.

Civil Aeronautics Administration's Aviation Education Service cooperated with the state departments of education in the various states in the development of their plans. Both the Connecticut and Pennsylvania plans recommend an elective aviation science course for high-school juniors and seniors which would have subject prerequisites and a level of difficulty commensurate with their needs. The Colorado plan proposes a separate course in "social aviation" for junior high schools which would deal with the political, economic, and social implications of aviation. Illinois plans to introduce a broad program of aviation-centered industrial arts and vocational education courses to supplement the regular program.

RECOGNIZING the need for area vocational schools, a special committee of Colorado educators has endorsed the Colorado State Board of Vocational Education's plan to set up eight, or possibly nine, area vocational schools at an annual expense of $956,000 (state funds) and $182,000 (federal funds, if and when they are available). The plan will be presented to the state legislature during its next session.

THE Women's National Group of the American Vocational Association which is made up of those women attending convention meetings and who are members of the AVA has been pioneering in the field of women-in-industry through the occasional publication of a *News Letter*. Cleo Murtland who recently retired from the faculty of the Vocational Education Department of the University of Michigan, is serving as editor. During the past year Grace A. Gilkey, Principal, Fanning Trade School, Worcester, Mass., has been chairman of the group. Mrs. E. F. King, Girls' Junior Trade School, Detroit, Mich., has been Secretary-Treasurer.

FRANK R. KEPLER, Supervisor of Vocational Education in the Detroit Public Schools, was honored at a dinner meeting November 3 in the Lee Plaza Hotel when Dr. Warren E. Bow, President of Wayne University and Superintendent of the Detroit Public Schools, presented Mr. Kepler with an honorary membership in the Mu Sigma Pi Graduate Fraternity in Industrial Education at Wayne University in recognition of his work in industrial arts and vocational education.

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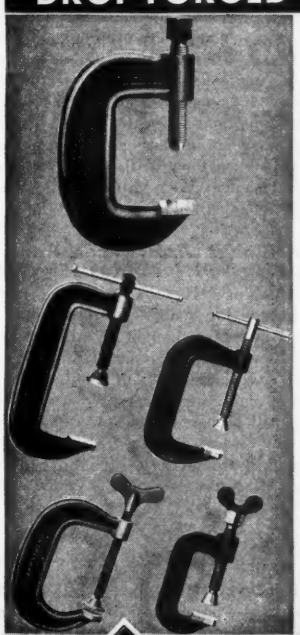

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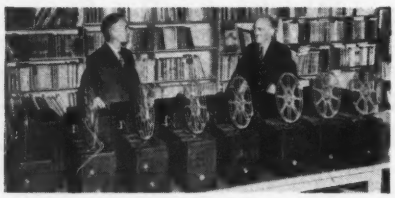
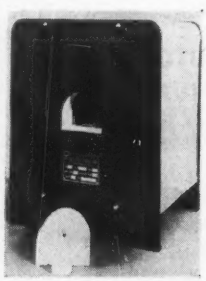
. . . news from INDUSTRY

Spokane Schools Buy Eight New Filmosound Motion Picture Units



In line with the rising interest in visual aids and their use in the classroom the Spokane, Wash., schools have purchased eight new Bell & Howell Filmosound motion picture units. R. R. Hutchison (at the left of the picture), special representative for Bell & Howell from Pullman, Wash., and J. M. Tewinkel, assistant superintendent of the Spokane schools, are shown inspecting the units, which were recently allotted the schools by government priority. For full information on Filmosound equipment and supplies, write the Bell & Howell Company, 7151 McCormick Rd., Chicago 45, Ill., *or check number 49 below.*

Harper Electric Furnace



A complete line of high temperature laboratory furnaces with maximum temperatures of 2750 F. and operating temperatures of 2500 F. is announced by the Harper Electric Furnace Corporation of Niagara Falls, N. Y.

Built for school laboratory uses where materials are to be heated in an oxidizing atmosphere at temperatures above those attainable with metallic elements, these furnaces also have many applications where special conditions are involved, such as rapid heating, or heating in special atmospheres not injurious to silicon carbide. Available for bench mounting or floor mounting, the furnaces may be obtained in either a plug type or counterbalanced door style. Complete specifications may be had by writing the Harper Electric Furnace Corp., Niagara Falls, N. Y., *or by checking number 50 below.*

Each item listed above is numbered. Check the numbers of the items you want, and mail the coupon, properly filled in, to . . .

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Ann Arbor, Michigan

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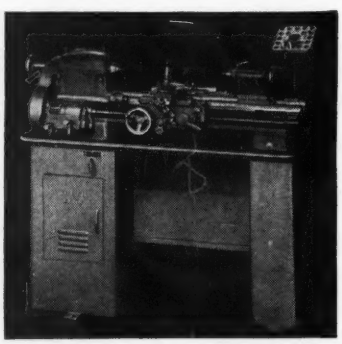
1-45

"General Catalog" Issue of "Modern Precision"

Leeds & Northrup Company announces a "General Catalog" issue of *Modern Precision*, which not only describes briefly all laboratory instruments manufactured by the company but also all of their equipment for regulating industrial processes and for heat-treating metals. Resistors, inductors, capacitors, standard cells, galvanometers and dynamometers, bridges, and potentiometers are described and illustrated, with the characteristics of the instruments shown by means of tables and charts. For your copy of this 28-page publication, write for Folder ENT (7) to the Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa., *or check number 51 below.*

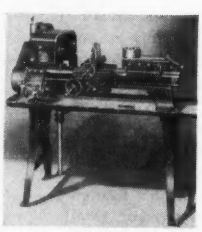
New South Bend Lathe

South Bend Lathe Works announces a new 9-inch precision lathe for exacting toolroom operations. The lathe has a 9¼" swing and takes 22" between centers, with a maximum collet capacity of ½" and a ¾" spindle bore.



The lathe is equipped with a quick change gear box, handwheel draw-in collet attachment, collet rack, taper attachment, thread dial indicator, thread cutting stop, large and small face plates, and micrometer carriage stop. Twelve spindle speeds are attainable, ranging from 41 to 1270 r.p.m. For full details write the South Bend Lathe Works, 181 E. Madison St., South Bend 22, Ind., *or check number 52 below.*

Logan Quick Change Gear Turret Lathe

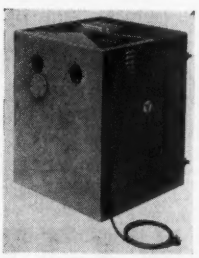


Handling bar stock up to and including ⅝" diameter, this new Logan lathe includes such design features as precision preloaded ball bearing spindle mounting, adjustable gibs to compensate for wear of turret and cross slide, and self-lubricating bronze bearings protecting 35 vital points in the lathe. Bedways ground to within 0.0005" of absolute accuracy, a lead screw held to within .002" in 12", and turret holes bored from the headstock guarantee maximum accuracy. The easily operated quick-change gear box provides 48 threads and feeds in either direction to the carriage. Simple adjustments of two levers make screw threads of from 8 to 224 per inch quickly available, and by changing the 24-tooth stud gear for the 48-tooth stud gear furnished with the lathe, additional threads of 4 to 7 per inch are equally accessible. For full information and complete specifications on this Logan No. 840 lathe write the Logan Engineering Co., 4901 West Lawrence Ave., Chicago 30, Ill., *or check number 53 below.*

Photocopying Equipment and Supplies

Duophoto Corporation of New York announces three new models of their Duophoto units. Each unit is complete in itself and includes the machine, a set of three trays, an electric dryer, a metal squeegee stand and squeegee for removing excess moisture from prints before drying, three bottles (or two jugs), chemicals and ½ gross of Duo Velva paper. The dryers are made with a chromium top, nichrome heating element, "two-heat" switch, and asbestos insulation. The squeegee stand has an easel back and folds up flat for convenience when not in use. A complete line of materials and supplies is available. For full details write the Duophoto Corporation, 30 West 25th Street, New York 10, N. Y., *or check number 54 below.*

Delta-Milwaukee Dust Collector



A compact, selfcontained unit, designed for use with an individual machine used in grinding, polishing, buffing, sanding, etc., the new Delta-Milwaukee dust collector, provided with special fittings to permit its attachment to any one of several Delta-Milwaukee machine tools, is activated by a powerful fan which sucks both fine and heavy dust and small particles through an efficient air filter. The filter is a permanent, cleanable one with low air resistance and is completely fireproof. A special woven glass filter is also available for use in collecting "flour fine" dust. The motor has sealed-for-life ball bearings, eliminating lubrication problems, and is located in a separate sealed compartment insulating it against dust. For further information, write the Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis., *or check number 55 below.*

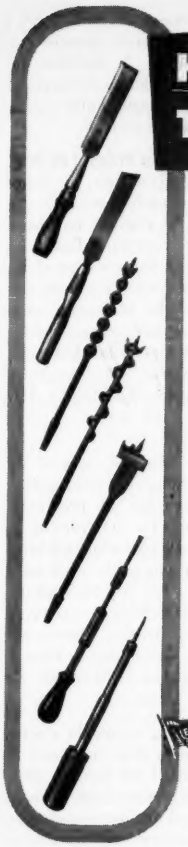
Stanley Works Announces Purchase of Russell Jennings Mfg. Co.

Russell Jennings Mfg. Co., makers of auger bits and located for some 90 years at Chester, Conn., has just been bought by the Stanley Works of New Britain, Conn. Manufacturing operations and shipments will continue from the Chester plant, but eventually a stock of auger bits will be carried in New Britain and shipped with other Stanley tools. For the latest catalog available, write the Russell Jennings Mfg. Co., Chester, Conn., *or check number 56 below.*

New Literature

Universal indexing head, specifications and data for its use on any tool or surface grinder, are given in a brochure available from the Cleveland Tool Engineering Co., 1255 West 4th St., Cleveland 13, Ohio, *or by checking number 57 below.*

HAND TOOLS FOR THE CRAFTSMAN



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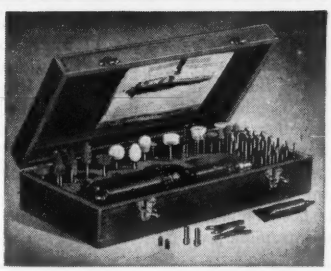

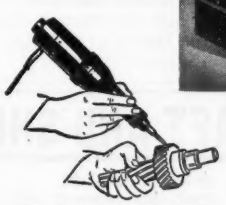

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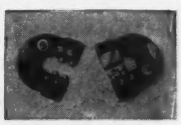

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INSTRUCTIONAL RESOURCES

Inquiries concerning materials described in these columns may be addressed to SCHOOL SHOP, 330 South State Street, Ann Arbor, Mich.

BOOKS:

Manual of Machine Shop Practice. Benedict. New York: McGraw-Hill Book Co., 1944. Pp. viii + 249. $1.75.

Published as a result of many requests that notes prepared by the author be put into a more convenient and permanent form, this book is not a machine-tool operation text but rather a presentation of material helpful to the student pursuing a course in engineering shop practice. Chapters are included on chisels and files, cutting speeds, screw threads, tapers, tolerances and allowances for machine parts, the use of common precision measuring devices, press tools, typical standard die sets, and machine-tool analysis. Ten experiments are given with questions and explanations.

Otis Benedict, Jr., is Assistant Professor, Department of Shop Practice, Pratt Institute, School of Science and Technology, Brooklyn, N.Y.

The Instructor and His Job. National Defense Curriculum Laboratory. Ithaca, N.Y.: Cornell University. Pp. 239.

This monograph, prepared under the auspices of the New York State Education Department's Bureau of Industrial and Technical Education in conjunction with the U. S. Office of Education, was developed to help the hundreds of new instructors, called on because of the war to train workers for industrial jobs, to do more effective work in their teaching of war-training classes. The thirteen chapters include discussions on the instructor and his job, how trainees learn, how to teach, individual differences, instructing individuals and groups, special teaching problems, breakdown of a job, planning for instruction, instructional aids, instructional management, measuring results of instruction, appraisal of the instructor, and the training of women. Line drawings and photographs are used to clarify the discussion.

MoToR's Truck Repair Manual. New York: MoToR Book Department, 572 Madison Ave., 1944 (revised). Pp. 914. $5.00.

A companion volume to *MoToR's Auto Repair Manual*, this revised edition of the *Truck Repair Manual* covers all essential jobs on some 10,000 truck models built since 1936, including all 287 makes of gasoline engines, as well as all Diesel engines and fuel injection systems. "Jeep" repair data is also given. The book has been thoroughly checked for accuracy by truck manufacturers' engineers. All trucks used by the Armed Forces (except two recent front axles) are covered, and such special truck equipment as governors, transmissions up to 10 speeds, transfer cases, torque dividers, front-driving axles, vacuum brakes, air brakes, etc., are fully discussed. The manual also gives service information on many buses, farm and industrial tractors, contractor and road-building machines, and stationary power machines. "Quick-indexed" for ease and efficiency in use.

Radio—Fundamental Principles and Practices. Almstead, Davis, Stone. New York: McGraw-Hill Book Co., 1944. Pp. vii + 219. $1.80.

Designed to give students the basic training in radio needed for immediate practical work in the services and in industry, this text begins with the electron theory, explaining the principles of radio and their practical applications in the simplest terms. Nineteen chapters (plus index) discuss the theory, equipment, operation, instruments, terms and mathematics needed to solve radio problems.

Francis E. Almstead is a lieutenant, USNR, Bureau of Naval Personnel, Washington, D. C. Kirke E. Davis is head of the science department at the Oceanside, N. Y., High School, and George K. Stone is Senior Education Supervisor, State Education Department, Albany, N. Y.

Pamphlets

The Training of Vocational Counselors, a 77-page booklet published by the Bureau of Training, War Manpower Commission, Washington, D. C., is an information bulletin designed primarily for those who are responsible for the training and placement of vocational counselors during the postwar readjustment period. Major sections of the book include a description of counselor positions, training programs for vocational counselors, and a brief description of selected federal agencies involved in these programs. A directory of agencies and their personnel and a summary of the Connecticut program of community organization and training are also included.

Driver Education and Training Manual for High School Teachers (1944 Revision), published by the American Automobile Association, is a well organized teachers' manual for driver education and training courses. Based on *Sportsmanlike Driving*, the five sections of the booklet cover the need for such a course, suggestions for teaching in the classroom, units used in behind-the-wheel instruction, driving skill tests, and forms and miscellaneous materials. Illustrated, 136 pages. Write the American Automobile Association, Washington, D.C.

Visual Aids

Scientists for Tomorrow tells the story of the annual Westinghouse Science Talent Search, opening with the depiction of presentday scientific achievements and the activities of the nation's science clubs and outlining the steps from the initial examinations to the final selection of the winners and their trip to Washington, D. C. The film is available for showing, without charge, from the Motion Picture and Speakers Bureau of the Westinghouse Electric & Mfg. Co., 306 Fourth Ave., Pittsburgh, Pa. Please mention SCHOOL SHOP.

Inside a Surface Condenser, second in a series of sound motion pictures depicting the construction and operation of the modern steam turbine, is available on a free loan basis or prints may be purchased for permanent use. The 16mm film has a screen running time of 18 minutes, with voice commentary recorded on the film. The film may be used in conjunction with "The Magic of Steam," first in the series, or separately. Animated drawings have been used extensively in the picture to clarify the condenser's working principles. For details regarding the free loan plan, address Public Relations Dep't., The Allis-Chalmers Mfg. Co., Milwaukee, Wis., *mentioning* SCHOOL SHOP.

Spray-Painting Equipment and **Care and Cleaning of Spray-Painting Equipment** are two new discussional type slidefilms available from the Jam Handy Organization. The films fully describe the construction, use, and care of spray-painting equipment. The latter totals 57 pictures, while "Spray-Painting Equipment" has 73 individual slides. Reasonably priced. Write the Jam Handy Organization, Inc., 2900 East Grand Blvd., Detroit 11, Michigan, *mentioning* SCHOOL SHOP.

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By Robert N. Auble, Signal Corps Radio School, Ind.

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*Note: These books have been listed in Leaflet No. 68 issued by U. S. Office of Education

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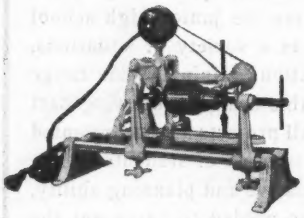

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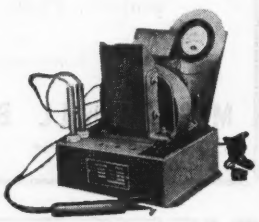

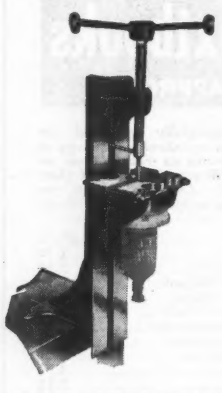

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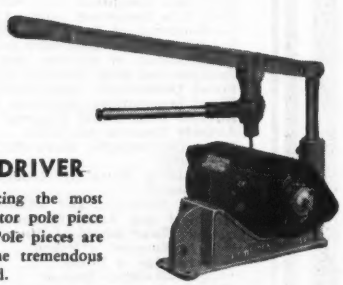
A quick-acting arbor and puller press. Used for removing and replacing bearings, bushings, races, slip rings and caps. Bendix drives and gear. Saves time and labor and prevents breakage. Puller Plate has suitable opening for every job, including the small magneto bearing races. Maximum distance from drift pin to plate, 16½".



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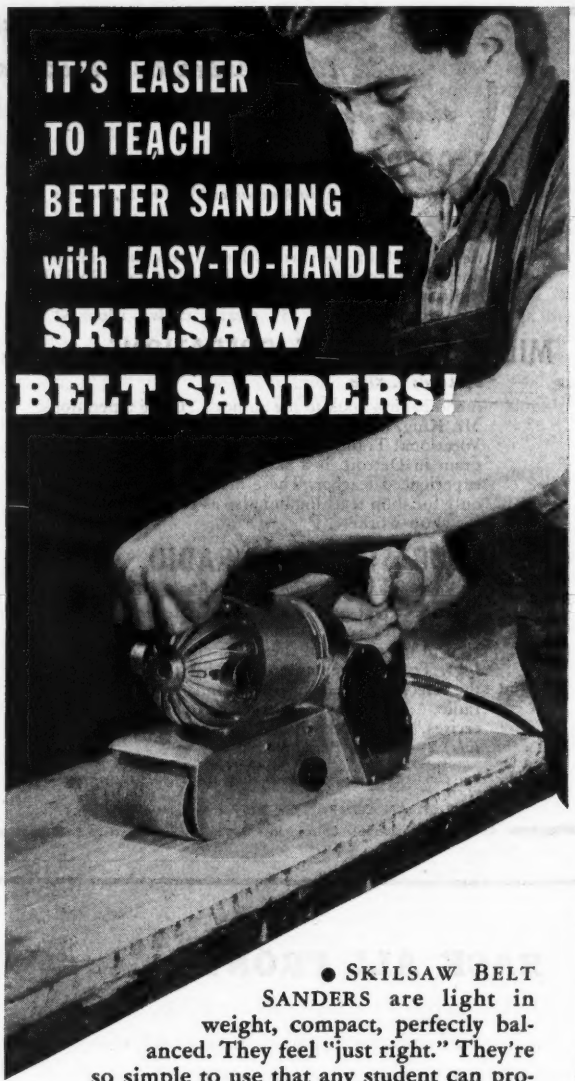

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A Challenge . . . *from page 8*

sideration.

33. Women appear to be finding an increasingly important place in certain occupations of vocational-technical character. Some war-production occupations now open to women may be less so after the war.

34. In states where the program of vocational-technical training is sufficiently large to warrant it, special state supervision of this work is recommended.

35. Training of vocational-technical type appears to warrant a relatively important place in postwar retraining programs of vocational education.

36. Studies of vocational-technical training needs in such fields as business, agriculture, home economics, public service occupations, and certain semi-professions, similar to the present study in the industrial field, should be made as soon as practicable.

The report is Vocational Division, U. S. Office of Education Bulletin No. 228 and Vocational-Technical Training Series No. 1. Copies may be secured from the Superintendent of Documents, Washington, D. C., for 40c.

The following are members of the Consulting Committee on Vocational-Technical Training appointed by the U. S. Commissioner of Education. Those whose names are followed by an asterisk are members of the Working Committee:

J. C. Wright, Assistant U. S. Commissioner for Vocational Education, U. S. Office of Education, Washington, D.C., Chairman.
Lynn A. Emerson*, Professor of Industrial Education, Cornell University, Ithaca, N.Y., Secretary.
Solomon Barkin, Director of Research, Textile Workers' Union of America, New York, N.Y.
M. R. Bass, Director, David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo.
M. M. Boring*, Engineering General Department, General Electric Company, Schenectady, N.Y.
Howard Campion, Assistant Superintendent in Charge of Vocational Education, Board of Education, Los Angeles, California.
Lt. Comdr. James R. Coxen, Shore Establishments Division, U. S. Navy Dept., Washington, D.C.
L. H. Dennis*, Executive Secretary, American Vocational Association, Washington, D.C.
L. J. Fletcher*, Director of Training, Caterpillar Tractor Co., Peoria, Ill.
Oakley Furney, Assistant State Commissioner for Vocational Education, Albany, N.Y.
A. C. Harper*, President, Wyomissing Polytechnic Institute, Wyomissing, Pa.
L. S. Hawkins*, Chief, Trade and Industrial Education Service, U. S. Office of Education, Washington, D.C.
M. H. Hedges*, Director of Research, International Brotherhood of Electrical Workers of America, Washington, D.C.
Arthur A. Hood, Chairman of Producers' Council Committee on Post-War Marketing, and Director of Dealer Relations, Johns-Manville Corporation, New York, N.Y.
F. J. Kelly, Chief, Higher Education Division, U. S. Office of Education, Washington, D.C.
B. F. Kyker, Chief, Business Education Service, U. S. Office of Education, Washington, D.C.
Karl Lark-Horovitz, Head, Department of Physics, Purdue University, Lafayette, Ind.
John A. McCarthy*, Assistant State Commissioner in Charge of Vocational Education, Trenton, N.J.
Clarence E. Rakestraw, Consultant, Employee-Employer Relations, U. S. Office of Education, Washington, D.C.
William F. Rasche, Director, Milwaukee Vocational School, Milwaukee, Wis.
E. F. Riley, President, North Dakota State School of Science, Wahpeton, N. Dak.
Robert H. Spahr*, Administrative Chairman, Division of Cooperative Training Programs, General Motors Institute, Flint, Mich.
Jesse W. Stillman*, Dupont Experiment Station, Wilmington, Del.
J. Raymond Walsh*, Director of Research, CIO Headquarters, Washington, D.C.
Robert J. Watt, International Representative, American Federation of Labor, Washington, D.C.
James A. Waln*, Special Representative, U. S. Office of Education, Washington, D.C., Secretary of Working Committee.

from Washington... *from page 32*

"To do this, however, is vastly different from establishing a federal educational enterprise.

"The benefits which are claimed for a national system of nonmilitary service—outdoor life, valuable work experience, vocational training, and physical discipline—can be gained at least as well by local educational systems as by a federal system. The educational profession has ready postwar plans for a broad program of education for all American youth, including vocational training and work experience.

"Let the federal government assist the states and localities to provide such a program through their local and state school systems. It will be far less expensive and far more in keeping with American policy to support and expand the educational institutions which we have than to create new ones under federal control," admonishes Dr. Carr.

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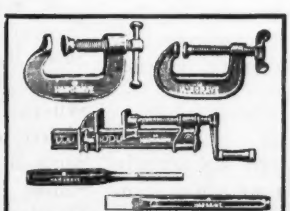

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from WASHINGTON by MICHAEL PACA

IS carpentry a military subject? Is training in auto mechanics military training?"

Thus asked President Roosevelt at his first press conference after his reelection. At this conference he brought up the subject of "universal training" for youth for the third time in one year. And with the above two questions he tried to sweep away the old concept of what used to be called compulsory military training and to suggest its fundamentally changed nature.

Mr. Roosevelt served notice that he will ask Congress to approve a plan requiring each youth to give one year of his life to his government, thereby tossing into the laps of Washington educators one of the truly explosive questions of this generation. The heat and smoke this issue has generated so far results, however, from the fact that Congressmen have one type of youth-training plan in mind, while the President has a vastly different one to propose. Even Washington officials are still confusing one with the other.

On Capitol Hill are the proponents of the "hup-two-three-march-drill" type of military training. They have introduced at least three different bills asking that 18-year olds be inducted into the Army for training in the old fashioned, manual-of-arms sense. These bills haven't gotten very far. The Post-War Military Policy Committee of the House, headed by Rep. Woodrum of Virginia, has not even recommended a hearing on them. Within the last few days the Committee has meekly suggested that compulsory military training "is on its agenda," and that if the Committee is continued in the next Congress it "ought to study the question carefully."

● President Roosevelt has a different idea to sell to the people. He does not speak of military training at all. He speaks of universal youth training, or of "asking every boy to spend one year in the service of his country." He is not concerned with teaching a youth how to shoot or fight. He is concerned with teaching him how to keep strong and clean in body, how to live outdoors, how to discipline himself, and yes, how to handle tools and learn the meaning of work.

● In the message which President Roosevelt will soon send to Congress on this subject, he will play down the military training aspects. He will say that the training he proposes will be good for peace as well as for war. He will say that skills in, say, carpentry or auto mechanics are useful for both soldier and civilian. He will urge a program designed to make the nation strong through vocational, citizenship, and physical education.

Such a proposal will knock the props from under the "hup-two-three-drill-march" school of military training. But at the same time it will not make educators very happy. For, within the package the President will present under the label of "youth training" may be wrapped the seeds of a new CCC and a new NYA.

● Specifically, what do Washington educators think about such proposals? J. C. Wright, Assistant U. S. Commissioner for Vocational Education, says: "If we may assume (1) that such legislation will provide for a year of service for youth between the ages of 17 and 21 and (2) that training will follow the completion of a secondary-school program. . . . I believe that provision should be made for vocational-technical training to round out the education of youth and help them bridge the gap between high school and college or between the vocational school and work."

● George F. Zook, president of the American Council on Education, sees no reason for haste. He says: "The ACE has taken the position that a universal military training program ought not to be adopted until there can be much more information about, and public discussion of, the implications of such a program.

"To this end, we have petitioned the President to consider the appointment of a national commission of representative leaders from industry, agriculture, labor, church, education, and the Congress to consider all pertinent matters relating to this exceedingly important proposal.

"As a result of widespread popular discussion," Dr. Zook concludes, "a much wiser and more lasting decision on this important matter can be secured."

● Keeping in mind clearly that actually two different proposals are under scrutiny, Dr. William G. Carr, of the Educational Policies Commission, has this to say about the traditional military type of training: "It is a postwar problem and decision upon it should be deferred. We do not know whether it will be necessary or unnecessary. . . .

"As for the inauguration of a federal system of nonmilitary education," Dr. Carr goes on to say, "we must remember that under the Constitution the control of civilian education is the responsibility of the several states. The federal government will undoubtedly continue to grant substantial financial assistance to education in the states and will probably increase the amounts of money involved.

(Continued on page 31)

Index to Advertisers

American Technical Society.....29
Armstrong Bros. Tool Co.....25
Atlas Press Co.....5
Barrett Equipment Co.....4
Bell & Howell Co.....17
Brodhead-Garrett Co.....23
Carboloy Co.....20
Castle Films, Inc.....9
Chicago Tool and Engineering Co.....23
Cincinnati Tool Co.....31
Colton's File Cleaners.....20
Concord Radio Corp.....18
Continental Machines, Inc.....cover 3
Duro Metal Products Co.....13
Eagle Pencil Co.....cover 4
Greenlee Tool Co.....27
Paul K. Guillow.....23
Walter O. Gutlohn, Inc.....25
Hudson Grading Corp.....21
Indianhead Archery Co.....21
International Textbook Co.....28
Kearney & Trecker Co.....3
Lafayette Radio Corp.....18
Logan Engineering Co.....6
Lufkin Rule Co.....27
The Macmillan Co.....29
Manual Arts Press.....20
McGraw-Hill Book Co.....29
McKnight & McKnight.....28
Meissner Mfg. Co.....15
MoToR Book Dept.....25
Precise Products Co.....27
John F. Rider, Publisher.....31
George Scherr Co.....27
E. H. Sheldon & Co.....24
Sheldon Machine Co.....cover 2
Silver Burdett Co.....29
Seaton H. Smith.....20
Skilsaw, Inc.....30
Society for Visual Education.....16
South Bend Lathe Works.....19
Stanley Tools.....21
Thordarson Electric Mfg. Co.....23
Victor Animatograph Corp.....2
Joseph Weidenhoff, Inc.....30

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